Phan Thành Nam CV (May 2024)

Personal Information

Born: July 3, 1985 in Tuy Hòa, Vietnam

Workplace: Department of Mathematics, LMU Munich

Address: Theresienstrasse 39, 80333 Munich, Germany

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Research Interests

Analysis and Mathematical Physics: Many-body quantum mechanics, Functional analysis, Spectral theory, Calculus of variations and Partial differential equations

Positions

Since 2017 Professor, Department of Mathematics, LMU Munich

2016–2017 Assistant Professor, Department of Mathematics, Masaryk University

2013–2016 IST Fellow with Robert Seiringer, IST Austria

2011–2013 Postdoc with Mathieu Lewin, CNRS & University of Cergy-Pontoise

Education

2011 Ph.D. in Mathematics, University of Copenhagen. Advisor: Jan Philip Solovej

2008 Master in Mathematics, University of Orléans. Advisor: Alain Pham Ngoc Dinh

2007 Bachelor in Mathematics & Computer Sciences, Vietnam National University at Ho Chi Minh City. Advisor: Dang Duc Trong

Awards

2022 Consolidator Grant of the European Research Council

2020 Prize of the European Mathematical Society

2018 Young Scientist Prize of the International Union of Pure and Applied Physics

Selected Invited Talks

2024 International Congress on Mathematical Physics, Strasbourg (Plenary speaker)

2021 International Congress on Mathematical Physics, Geneva (Invited speaker)

2021 European Congress of Mathematics, Portorož, Slovenia (EMS Prize Lecture)

2018 International Congress on Mathematical Physics, Montréal (IUPAP Prize Lecture)

2012 International Congress on Mathematical Physics, Aalborg (Invited speaker)

Supervision

PhD students: François Visconti (current, co-supervision with Arnaud Triay), Charlotte Dietze (current), Martin Ravn Christiansen (graduated 2023, co-supervision with Christian Hainzl), Dinh-Thi Nguyen (graduated 2020, currently Postdoc at Uppsala University)

Postdocs: Simone Rademacher (current), Peter Madsen (current), Giao Ky Duong (current), Martin Ravn Christiansen (current), Lea Bossmann (2022–2024, currently Tenure-track Junior Professor at University of Mainz), Jinyeop Lee (2021–2024, currently Postdoc at University of Basel), Arnaud Triay (2019–2022, currently Professor at LMU Munich), Julien Ricaud (2017–2021, from August 2024 Investigador Asociado at Universidad Nacional Autónoma de México)

Mini-courses for Young Researchers

2024	Summer school "Current topics in Mathematical Physics", University of Zurich
2023	Random phase approximation for the mean-field electron gas, Chinese Academy of Sciences, Beijing
2022	Semiclassical approximation for Schrödinger operators, VNU-Ho Chi Minh City
2022	The mathematics of interacting Bose gases, VIASM Hanoi
2022	Bosonization and Bogoliubov diagonalization method for Fermi gases, University of Copenhagen, 4EU+ Masterclass
2021	The mathematical theory of interacting Bose gases, Peking University
2021	Mathematics of Bose–Einstein condensation and related phenomena, KIAS, Korea
2017	Collective behaviors of weakly interacting Bose gases, SISSA, Trieste
2016	Mean-field approximation for large quantum systems, VNU-Ho Chi Minh City

Co-organizer of Conferences

2024	VIASM Summer School in Mathematical Physics, Hue, Aug. 5-10
2024	Conference "Resonances in the Mathematical World", Ho Chi Minh City, Aug. 1-4
2024	Workshop "Frontiers in Analysis and Mathematical Physics", Seoul, April 8-12
2023	Oberwolfach Mini-Workshop "Mathematics of Many-body Fermionic Systems", Oct. 29 - Nov. 4
2023	VIASM-IAMP Summer School in Mathematical Physics, Quy Nhon, Aug. 1-5
2023	Workshop of Young Researchers in Mathematical Physics, Westerham, July 5-7
2022	Conference "Mathematical results of many-body quantum systems", Herrsching, June 6-11
2018	Conference "Recent Results on Quantum Many-Body Systems" in honor of Heinz Siedentop, Herrsching, May 7-9

Other Scientific Services

2022–	Member of Scientific Council, Vietnam Institute for Advanced Study in Mathematics (VIASM). Distinguished Associate Member of VIASM since 2020
2024–	Editor for Mathematische Zeitschrift
2020–	Editor for Mathematical Physics, Analysis and Geometry

Publications

Research Papers

63. M. R. Christiansen, C. Hainzl, P. T. Nam. "The Correlation Energy of the Electron Gas in the Mean-Field Regime". Preprint 2024. arXiv:2405.01386.

62. G. K. Duong, R. L. Frank, T. M. T. Le, P. T. Nam, P. T. Nguyen. "Cwikel-Lieb-Rozenblum type inequalities for Hardy-Schrödinger operator". Preprint 2023. arXiv:2312.16482.

61. C. Dietze, P. T. Nam. "Hardy-Sobolev interpolation inequalities". *Calc. Var. Partial Differential Equations*, in press. arXiv:2312.11249.

60. C. Brennecke, J. Lee, P. T. Nam. "Second order expansion of Gibbs state reduced densities in the Gross-Pitaevskii regime". *SIAM J. Math. Anal.*, in press. arXiv:2310.05448.

59. M. Lewin, P. T. Nam. "Positive-density ground states of the Gross-Pitaevskii equation". Preprint 2023. arXiv:2310.03495.

58. P. T. Nam, S. Rademacher. "Exponential bounds of the condensation for dilute Bose gases". Preprint 2023. arXiv:2307.10622.

57. L. Bossmann, C. Dietze, P. T. Nam. "Focusing dynamics of 2D Bose gases in the instability regime". Preprint 2023. arXiv:2307.00956.

56. R. Arora, P. T. Nam, P.T. Nguyen. "Semiclassical Moser–Trudinger inequalities". *Trans. Amer. Math. Soc.* **277** (2024), 3243–3260.

55. F. Haberberger, C. Hainzl, P. T. Nam, R. Seiringer, A. Triay. "The free energy of dilute Bose gases at low temperatures". Preprint 2023. arXiv:2304.02405.

54. M. R. Christiansen, C. Hainzl, P. T. Nam. "The Gell-Mann–Brueckner Formula for the Correlation Energy of the Electron Gas: A Rigorous Upper Bound in the Mean-Field Regime". *Commun. Math. Phys.* **401** (2023), 1469-1529.

53. P. T. Nam. "A proof of the Lieb-Thirring inequality via the Besicovitch covering lemma". *Acta Mathematica Vietnamica* **48** (2023), 75-81. Special issue dedicated to Professor Duong Minh Duc on the occasion of his 70th birthday.

52. M. R. Christiansen, C. Hainzl, P. T. Nam. "On the Effective Quasi-Bosonic Hamiltonian of the Electron Gas: Collective Excitations and Plasmon Modes". *Lett. Math. Phys.* **112** (2022), Art. 114. Themed collection "Mathematical Physics and Numerical Simulation of Many-Particle Systems", edited by V. Bach and L. Delle Site.

51. P. T. Nam, J. Ricaud, A. Triay. "Ground state energy of the low density Bose gas with three-body interactions". *J. Math. Phys.* **63** (2022), 071903. Special collection in honor of Freeman Dyson, edited by J. P. Solovej, R. Benguria and M. Zirnbauer.

50. P. T. Nam, J. Ricaud, A. Triay. "The condensation of a trapped dilute Bose gas with three-body interactions". *Prob. Math. Phys.* **4** (2023), pp. 91-149.

49. P. T. Nam, A. Triay. "Bogoliubov excitation spectrum of trapped Bose gases in the Gross-Pitaevskii regime". *J. Math. Pures Appl.* **176** (2023), 18-101.

48. M. R. Christiansen, C. Hainzl, P. T. Nam. "The Random Phase Approximation for Interacting Fermi Gases in the Mean-Field Regime". *Forum Math. Pi* **11** (2023), e32, 1-131.

47. N. Benedikter, P. T. Nam, M. Porta, B. Schlein, R. Seiringer. "Bosonization of Fermionic Many-Body Dynamics". *Ann. Henri Poincaré* **23** (2022), pp. 1725–1764.

46. R. L. Frank, P. T. Nam. "Existence and nonexistence in the liquid drop model". *Calc. Var. Partial Differential Equations*, **60**, 223 (2021), pp. 1-12.

45. P. T. Nam, M. Napiórkowski. "Two-term expansion of the ground state one-body density matrix of a mean-field Bose gas". *Calc. Var. Partial Differential Equations* **60**, 99 (2021), pp. 1-30.

44. K. Kögler, P. T. Nam. "The Lieb-Thirring inequality for interacting systems in strong-coupling limit". *Arch. Ration. Mech. Anal.* **240** (2021), pp. 1169–1202.

43. N. Benedikter, P. T. Nam, M. Porta, B. Schlein, R. Seiringer. "Correlation energy of a weakly interacting Fermi gas". *Invent. Math.* **225** (2021), pp. 885–979.

42. P. T. Nam, M. Napiórkowski, J. Ricaud, A. Triay. "Optimal rate of condensation for trapped bosons in the Gross-Pitaevskii regime". *Analysis & PDE* **15** (2022), 1585–1616.

41. M. Lewin, P. T. Nam, N. Rougerie. "Classical field theory limit of many-body quantum Gibbs states in 2D and 3D". *Invent. Math.* **224** (2021), 315–444.

40. P. T. Nam, N. Rougerie. "Improved stability for 2D attractive Bose gases". *J. Math. Phys.* **61** (2020), 021901.

39. D. Mukherjee, P. T. Nam, P. T. Nguyen. "Uniqueness of ground state and minimal-mass blow-up solutions for focusing NLS with Hardy potential". *J. Funct. Anal.* **281** (2021), 109092.

38. S. Larson, D. Lundholm, P. T. Nam. "Lieb-Thirring inequalities for wave functions vanishing on the diagonal set". *Annales Henri Lebesgue* **4** (2021), 251–282.

37. P. T. Nam, R. Salzmann. "Derivation of 3D energy-critical nonlinear Schrödinger equation and Bogoliubov excitations for Bose gases". *Commun. Math. Phys.* **375** (2020), pp. 495–571.

36. N. Benedikter, P. T. Nam, M. Porta, B. Schlein, R. Seiringer. "Optimal upper bound for the correlation energy of a Fermi gas in the mean-field regime". *Commun. Math. Phys.* **374** (2020), pp. 2097–2150.

35. R. L. Frank, D. Hundertmark, M. Jex, P. T. Nam. "The Lieb-Thirring inequality revisited". *J. Eur. Math. Soc.* **23** (2021), pp. 2583–2600.

34. N. Gottschling, P. T. Nam. "Convergence of Levy-Lieb to Thomas-Fermi density functional". *Calc. Var. Partial Differential Equations* **57** (2018), pp. 105–117.

33. A. Michelangeli, P. T. Nam, A. Olgiati. "Ground state energy of mixture of Bose gases". *Rev. Math. Phys.* **31** (2019) p. 1950005.

32. C. Brennecke, P. T. Nam, M. Napiórkowski, B. Schlein. "Fluctuations of N-particle quantum dynamics around the nonlinear Schrödinger equation". *Ann. Inst. H. Poincaré (C) Anal. Non Linéaire* **36** (2019), pp. 1201–1235.

31. P. T. Nam, M. Napiórkowski. "Norm approximation for many-body quantum dynamics: focusing case in low dimensions". *Advances in Math.* **350** (2019), pp. 547–587.

30. P. T. Nam. "Lieb-Thirring inequality with semiclassical constant and gradient error term". *J. Funct. Anal.* **274** (2018), pp.1739–1746.

29. P. T. Nam. "Binding energy of homogeneous Bose gas". *Lett. Math. Phys.* **108** (2018), pp. 141–159.

28. M. Lewin, P. T. Nam, N. Rougerie. "Gibbs measures based on 1D (an)harmonic oscillators as mean-field limits". *J. Math. Phys.* **59** (2018), p. 041901.

27. R. L. Frank, P. T. Nam, H. Van Den Bosch. "The maximal excess charge in Müller density-matrix-functional theory". *Ann. Henri Poincaré* **19** (2018), pp. 2839–2867.

26. R. L. Frank, P. T. Nam, H. Van Den Bosch. "The ionization conjecture in Thomas-Fermi-Dirac-von Weizsäcker theory". *Comm. Pure Appl. Math.* **71** (2018), pp. 577–614.

25. P. T. Nam, M. Napiórkowski. "A note on the validity of Bogoliubov correction to mean-field dynamics". *J. Math. Pures Appl.* **108** (2017), 662–688.

24. R. L. Frank, R. Killip, P. T. Nam. "Nonexistence of large nuclei in the liquid drop model". *Lett. Math. Phys.* **106** (2016), 1033–1036.

23. P. T. Nam, H. Van Den Bosch. "Nonexistence in Thomas-Fermi-Dirac-von Weizsäcker theory with small nuclear charges". *Math. Phys. Anal. Geom.* (2017), 20:6.

22. M. Lewin. P. T. Nam, N. Rougerie. "A note on 2D focusing many-boson systems". *Proc. Amer. Math. Soc.* **145** (2017), pp. 2441-2454.

21. P. T. Nam, M. Napiórkowski. "Bogoliubov correction to the mean-field dynamics of interacting bosons". *Adv. Theor. Math. Phys.* **21** (2017), pp. 683–738.

20. P. T. Nam, M. Napiórkowski, J. P. Solovej. "Diagonalization of bosonic quadratic Hamiltonians by Bogoliubov transformations". *J. Funct. Anal.* **270** (2016), pp. 4340–4368.

19. P. T. Nam, N. Rougerie, R. Seiringer. "Ground states of large bosonic systems: The Gross-Pitaevskii limit revisited". *Analysis & PDE* **9** (2016), pp. 459–485.

18. D. Lundholm. P. T. Nam, F. Portmann. "Fractional Hardy-Lieb-Thirring and related inequalities for interacting systems". *Arch. Ration. Mech. Anal.* **219** (2016), pp. 1343–1382.

17. M. Lewin, P. T. Nam, N. Rougerie. "Derivation of nonlinear Gibbs measures from many-body quantum mechanics". *Journal de l'École Polytechnique – Mathématiques* **2** (2015), pp. 65–115.

16. M. Lewin, P. T. Nam, N. Rougerie. "The mean-field approximation and the nonlinear Schrödinger functional for trapped Bose gases". *Trans. Amer. Math. Soc.* **369** (2016), pp. 6131–6157.

15. P. T. Nam, R. Seiringer. "Collective excitations of Bose gases in the mean-field regime". *Arch. Ration. Mech. Anal.* **215** (2015), pp. 381–417.

14. M. Lewin, P. T. Nam, N. Rougerie. "Remarks on the quantum de Finetti theorem for bosonic systems". *Appl. Math. Res. Express* (AMRX) **1** (2015), pp. 48–63.

13. M. Lewin, P. T. Nam, B. Schlein. "Fluctuations around Hartree states in the mean-field regime". *Amer. J. Math.* **137** (2015), pp. 1613–1650.

12. M. Lewin, P. T. Nam, N. Rougerie. "Derivation of Hartree's theory for generic mean-field Bose systems". *Advances in Math.* **254** (2014), pp. 570–621.

11. M. Lewin, P. T. Nam, S. Serfaty, J. P. Solovej. "Bogoliubov spectrum of interacting Bose gases". *Comm. Pure Appl. Math.* **68** (2015), pp. 413–471.

10. P. T. Nam, F. Portmann, J. P. Solovej. "Asymptotics for two dimensional atoms". *Ann. Henri Poincaré* **13** (2012), pp. 333–362.

9. P. T. Nam. "New bounds on the maximum ionization of atoms". *Commun. Math. Phys.* **312** (2012), pp. 427–445.

8. P. T. Nam, A. Pham Ngoc Dinh, P.H. Quan, D. D. Trong. "Ice formation in the Arctic during summer: false-bottoms". *Appl. Math. Comput.* **227** (2014), pp. 857–870.

7. D. D. Trong, P. T. Nam, P.T. Thuc. "The body force in a three-dimensional Lamé system: identification and regularization". *Inverse Probl. Sci. Eng.* **20** (2012), pp. 517–532.

6. P. T. Nam. "An approximate solution for nonlinear backward parabolic equations". *J. Math. Anal. Appl.* **367** (2010), pp. 337–349.

5. P. T. Nam, D. D. Trong, N. H. Tuan. "The truncation method for a two-dimensional nonhomogeneous backward heat problem". *Appl. Math. Comput.* **216** (2010), pp. 3423–3432.

4. D. D. Trong, M. N. Minh, A. Pham Ngoc Dinh, P. T. Nam. "Hölder-type approximation for the spatial source term of a backward heat equation". *Numer. Funct. Anal. Optim.* **31** (2010), pp. 1386–1405.

3. D. D. Trong, A. Pham Ngoc Dinh, P. T. Nam. "Determine the spatial term of a two-dimensional heat source". *Applicable Analysis* **88** (2009), pp. 457–474.

2. P. T. Nam, M. N. Minh. "Proof of a conjecture on general means". *J. Inequal. Pure Appl. Math.* **9** (2008), no. 3, Article 86.

1. D. D. Trong, A. Pham Ngoc Dinh, P. T. Nam, T. T. Tuyen. "Determination of the body force of a two-dimensional isotropic elastic body". *J. Comput. Appl. Math.* **229** (2009), pp. 192-207.

Reviews

15. P. T. Nam. "The ionization problem in quantum mechanics". In: *The Physics and Mathematics of Elliott Lieb*, EMS Publishing House (2022). A book in honour of Elliott H. Lieb's 90th birthday, edited by R. L. Frank, A. Laptev, M. Lewin and R. Seiringer.

14. P. T. Nam, J. Ricaud, A. Triay. "Dilute Bose gas with three-body interaction: recent results and open questions". *J. Math. Phys.* **63** (2022), 061103. Proceedings of the 20th ICMP, Geneva 2021.

13. P. T. Nam. "Bogoliubov excitation spectrum of Bose gases". Proceedings of the 8th European Congress of Mathematics, Portorož June 20–26, 2021, pp. 585–605.

12. P. T. Nam. "The Ionization Problem". *EMS Newsletter*, December 2020, pp. 22–27.

11. P. T. Nam. "Direct methods to Lieb-Thirring kinetic inequalities". Lecture Notes Series, IMS National University of Singapore, Vol. 41: Density Functionals for Many-Particle Systems, pp. 81-115 (2023).

10. M. Lewin, P. T. Nam, N. Rougerie. "Derivation of renormalized Gibbs measures from equilibrium many-body quantum Bose gases". *J. Math. Phys.* **60** (2019), 061901. Proceedings of the 19th ICMP, Montreal 2018.

9. P. T. Nam. "Nonlinear Gibbs measure and Bose gases at positive temperature". *IAMP News Bulletin*, January 2019, 3-19.

8. M. Lewin, P. T. Nam, N. Rougerie. "The interacting 2D Bose gas and nonlinear Gibbs measures". *Oberwolfach Reports*, 15(2):1081–1116, 2018.

7. M. Lewin, P. T. Nam, N. Rougerie. "Blow-up profile of rotating 2D focusing Bose gases". In: *Macroscopic Limits of Quantum Systems*, edited by D. Cadamuro, M. Duell, W. Dybalski and S. Simonella, Springer 2018, pp. 145–170. Proceedings of a conference in honor of Herbert Spohn's 70th birthday, Munich 2017.

6. R. L. Frank, P. T. Nam, H. van den Bosch. "A short proof of the ionization conjecture in Müller theory". In: *Mathematical Problems in Quantum Physics*, edited by F. Bonetto, D. Borthwick, E. Harrell and M. Loss, AMS Contemporary Mathematics 717 (2018), pp. 1-12. Proceedings of QMATH13, Atlanta 2016.

5. P. T. Nam, M. Napiórkowski. "Norm approximation for many-body quantum dynamics and Bogoliubov theory". In: *Advances in Quantum Mechanics*, edited by A. Michelangeli and G. Dell'Antonio, Springer INdAM Ser. 18 (2017), pp. 223-238.

4. R. L. Frank, P. T. Nam, H. van den Bosch. Maximum ionization in Thomas-Fermi-Dirac-Weizsácker theory. *Oberwolfach Reports*, 13(3):2500-2502, 2016.

3. M. Lewin, P. T. Nam, N. Rougerie. "Bose Gases at Positive Temperature and Non-Linear Gibbs Measures". Proceedings of the 18th ICMP, Santiago 2015.

2. P. T. Nam. "On the number of electrons that a nucleus can bind". *XVIIth International Congress on Mathematical Physics*, A. Jensen (ed.), World Sci. Publ. 2013, pp. 504–511. Proceedings of the 17th ICMP, Aalborg 2012.

1. D. D. Trong, P. T. Nam, M. N. Minh. "Recovering a class of entire functions and application to heat equations". *Vietnam J. Math.* **37** (2009), pp. 1-19. Proceedings of the Vietnam Mathematical Congress, Quy Nhon 2008.